

Precise phosphate measurement with the yellow method*

The quality requirements for discharge from municipal wastewater treatment plants into surface waters are becoming increasingly stringent. In the past, only the emissions of sewage treatment plants in the form of pollutant concentrations or loads were monitored, but today the contamination in the waters where discharge takes place is also assessed.

In step with the tighter permit limits, reliable online measuring instruments will be required in order to measure phosphate concentrations significantly less than 0.1 mg/L PO₄-P for control and regulation, as well as for monitoring run-off.

The blue method has been used most often for such low-range measurements, as the self-colouration of the wastewater can have an influence on the measurement result.

Now, a revised yellow method (Yellow 2.0) and an optimised photometer unit from Hach[®] are setting new standards in low-range phosphate measurements. The Phosphax sc LR ("Low Range") is the latest addition to the Phosphax sc series, which has been in successful use for a number of years. TU Darmstadt was commissioned to undertake a study of the product, which has confirmed this claim in all respects.

With the new requirements for municipal wastewater treatment plants in mind, the objective of the report was to check and evaluate the operational suitability of the molybdenum blue method (blue method) and the vanadate-molybdate method (yellow method) at low concentrations of less than 0.1 mg/L PO₄-P using two Hach phosphate analysers.

Summary of the study: The investigation has shown that the Phosphax sc Low Range based on the vanadate-molybdate method (yellow method) is suitable for low PO₄-P concentrations in advanced wastewater treatment applications. It could not be determined whether the self-colouration of the biologically treated wastewater had an influence on the detection of PO₄-P concentrations (despite the additional use of iron III chloride for additional phosphate reduction). Based on the laboratory comparative measurements using DIN EN ISO 6878 (2004) and the



We would be happy to provide the complete study to interested parties

cuvette test (LCK 349 and LCK349 trace), it was clear that there was a good correlation in the measured values at PO₄-P concentrations of 0.03 mg/L and upward.

The report showed that the Phosphax sc Low Range based on the vanadate-molybdate process is in principle suitable for advanced wastewater treatment applications in the context of low orthophosphate concentrations of up to 0.03 mg/L.

*Test of two Hach Phosphat Analyzers at the wastewater treatment plant of the Abwasserverband Langen, Egelsbach, Erzhausen", October 2018. Institut IWAR, Technische Universität Darmstadt

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Hach has thereby succeeded in developing an online measuring instrument that surpasses the future requirements of the EU Water Framework Directive. With a measuring range of 0.015 - 2.0 mg/L PO₄-P orthophosphate, there is now a device on the market which can reliably monitor even low phosphate loads in bodies of surface water.

Other benefits of the Phosphax sc Low Range and yellow method 2.0:

- No cooling required for reagents
- Ready-to-use reagent set
- Proven, straightforward operation
- Optimised reagent dosage (yellow method 2.0) for accurate measurements in the 0.015 - 2.0 mg/L PO₄-P orthophosphate measurement range
- Robust and reliable indoor/outdoor analyser

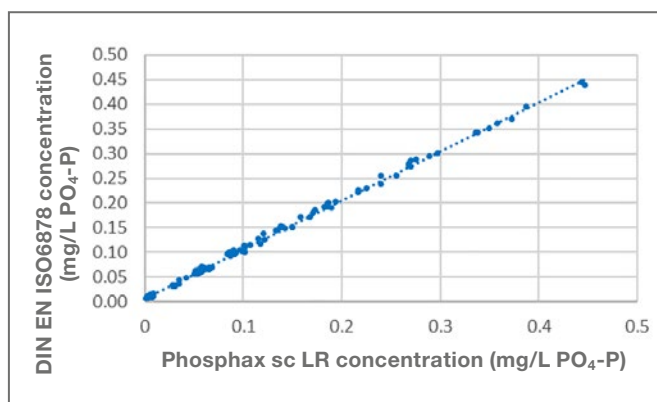


Figure 1: Comparison of laboratory measurements performed in accordance with DIN EN ISO 6878 (2004) with the measured values (n = 116) from the Phosphax sc Low Range

Measuring range	0.015 - 2 mg/L
Parameter	PO ₄ -P
Limit of detection	0.015 mg/L
Accuracy	± 2 % ± 0.015 mg/L
Reproducibility	0.7 % + 0.005 mg/L
Measuring principle	Photometric method (double-beam photometer)
Measurement technique	Vandate-molybdate
Meas. interval	10 - 120 min

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